

REMARKS

Claims 1, 3-5, 7 and 8 are pending and under consideration in the above-identified application, and Claims 2 and 6 were previously cancelled.

In the Final Office Action, Claims 1, 3-5, 7 and 8 were rejected.

In this Amendment, Claims 1, 3-5, 7 and 8 are amended, and Claims 9 – 11 have been added. No new matter has been introduced as a result of this Amendment.

Accordingly, Claims 1, 3-5, 7 and 8 - 11 are at issue.

I. 35 U.S.C. § 112 Indefiniteness Rejection of Claims 1, 4 and 5

Claims 1, 4 and 5 were rejected under 35 U.S.C. § 112, first paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As required by the Examiner, Applicant has appropriately amended Claims 1, 4 and 5 to remove the indefiniteness issues.

Accordingly, Applicant respectfully requests that the claim rejection be withdrawn.

II. 35 U.S.C. § 103 Obviousness Rejection of Claims 1 and 5

Claims 1 and 5 were rejected under 35 U.S.C. § 102(b)/103(a) as being unpatentable over *Fukai et al.* (“*Fukai*”), JP 2001-122628. Although Applicant respectfully traverses this rejection, Claim 1 has been amended to clarify the invention and remove any ambiguities that may have been at the basis of this claim rejection.

Claim 1 is directed to a cathode material, which comprises a complex oxide including lithium (Li), manganese (Mn), chromium (Cr) and aluminum (Al). The complex oxide is represented by a chemical formula $\text{Li}_a \text{Mn}_b \text{Cr}_c \text{Al}_{1-b-c} \text{O}_d$ (where the values of a, b, c, and d are within the ranges of $1.4 < a < 1.55$, $0.5 < b+c < 1$, $1.8 < d \leq 2.5$).

That is, the lithium composition a satisfies $1.4 < a < 1.55$ and the compositions of the other components of the lithium composite oxide satisfy the following respective ranges $0.5 < b+c < 1$, and $1.8 < d \leq 2.5$.

This claimed range, $1.4 < a < 1.55$, satisfied by the lithium composition a provides for a maximum value of a discharge capacity. This is supported on page 22 of the specification as follows (emphasis added):

“Moreover, it was found out from the results of Examples 1-2 and 1-4 through 1-6 that there was a tendency that as the composition a of lithium increased, *the discharge capacity increased until reaching the maximum value when the composition a was approximately 1.5, then the discharge capacity decreased. In other words, it was found out that when the composition a of lithium was within a range of $1.1 < a \leq 1.55$, a larger discharge capacity could be obtained.*”

This is clearly unlike *Fukai*. *Fukai* teaches a multi-component oxide expressed by the general formula: $Li_x Mn_{1-y-z} M_y N_z O_a$

where M denotes at least one element selected from the group consisting of Cr and Al, N denotes at least one element selected from the group including Mg and Ti and the values of x, y, z, and a are within a range of $0.8 < x < 1.2$, $0 < y < 0.2$, $0 \leq z \leq 0.2$ and $1.8 < a < 2.3$.

That is, *Fukai* teaches that the lithium composition x of the multi-component is limited to be equal to or less than 1.2, instead of being greater than 1.4 and less than 1.55, as required by Claim 1. Thus, the two ranges, namely $0.8 < x < 1.2$ disclosed by *Fukai* and $1.4 < a < 1.55$ claimed in the present application, do not overlap one another. Moreover, as disclosed in the present application, a significantly larger discharge capacity is attained as the lithium composition a approaches 1.55, which is significantly distant from the $0.8 < x < 1.2$ range disclosed by *Fukai* that one of ordinary skill in the art does not obtain or deduce the claimed range by routine experimentation.

Thus, Claim 1 is patentable over *Fukai*.

Independent Claim 5, which recites the same distinguishable limitation as that of Claim 1, is also patentable over *Fukai* for at least the same reasons.

Accordingly, Applicant respectfully request that this claim rejection be withdrawn.

III. 35 U.S.C. § 103 Obviousness Rejection of Claims 3, 4, 7 and 8

Claims 3, 4, 7 and 8 were rejected under 35 U.S.C. 103(a) as being unpatentable over *Fukai*. Applicant respectfully traverses this rejection.

Claim 3, which is directed to a cathode material, recites in relevant part that:

“...the complex oxide is represented by a chemical formula $\text{Li}_{1+e}(\text{Mn}_f\text{Cr}_g\text{M}_{1-f-g})_{1-e}\text{O}_h$ (where M is at least one kind of element selected from the group consisting of titanium, magnesium and aluminum, and the values of e, f, g and h are within a range of $0.35 < e < 0.4$, $0.2 < f < 0.5$, $0.3 < g < 1$, $f + g < 1$ and $1.8 < h < 2.5$).”

That is, the composition $1+e$ of the lithium is given such that e satisfies $0.35 < e < 0.4$, the total the composition $f+g$ of the total of manganese and chromium is specified to be less than 1, the composition f of manganese satisfies $0.2 < f < 0.5$, and the composition g of chromium satisfies $0.3 < g < 1$.

This is clearly unlike *Fukai*. *Fukai* teaches a multi-component oxide expressed by the general formula:



where M denotes at least one element selected from the group consisting of Cr and Al, N denotes at least one element selected from the group including Mg and Ti and the values of x, y, z, and a are within a range of $0.8 < x < 1.2$, $0 < y < 0.2$, $0 \leq z \leq 0.2$ and $1.8 < a < 2.3$.

Thus, the two ranges, namely $0.8 < x < 1.2$ disclosed by *Fukai* and $1.35 < 1+e < 1.4$ derived from the above listed range for e and claimed in the present application, do not overlap one another. Moreover, as disclosed in the present application, a significantly larger discharge capacity is attained as the lithium composition a gets larger and approaches 1.4, which is significantly distant from the $0.8 < x < 1.2$ range disclosed by *Fukai* that one of ordinary skill in the art does not obtain or deduce the claimed range by routine experimentation.

Further, as *Fukai* teaches that M may be a mixture of Cr and Al when $z = 0$, then the composition y of the chromium satisfies $0 < y < 0.2$. As the Examiner stated *Fukai* teaches that y and z can be at most 0.2, thus the compositions of manganese ($1 - y - z$) can not be less than 0.6. As such, *Fukai teaches away* from the required manganese values which are greater than 0.2 and smaller than 0.5, so as to avoid higher values of manganese which leads to a decrease in the redox center and thereby a decline in the charge-discharge capacity.

Thus, for at least the above discussed reasons Claim 3 is patentable over *Fukai*.

Claim 7 has been amended in a similar fashion as Claim 3, and is thus also patentable over *Fukai*.

Method Claims 4 and 8, which recite the same distinguishable limitation as that of Claims 3 and 7, respectively, are also patentable over *Fukai*.

Accordingly, Applicants respectfully request that these claim rejections be withdrawn.

IV. Claims 9 -11

New Claims 9 - 11, which recite the same distinguishable limitation as that of Claim 1, are also patentable over *Fukai*.

V. Conclusion

In view of the above amendments and remarks, Applicant submits that all claims are clearly allowable over the cited prior art, and respectfully requests early and favorable notification to that effect.

Respectfully submitted,

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